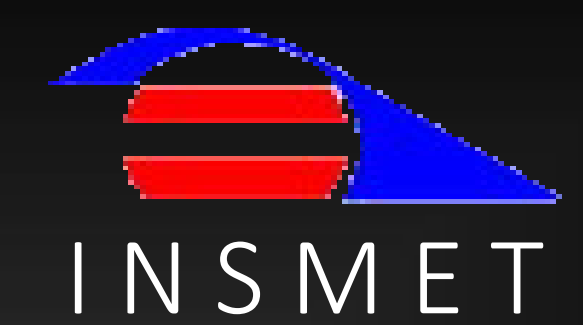# Assessment of RegCM4 ability to reproduce drought in the Caribbean region and future projections under climate change conditions

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Abstract

A region in the planet that has to face significant challenges in terms of drought is the Caribbean. Therefore, it is important to know how this phenomenon will change under climate change conditions over this particular region. In the present work we assess the ability of RegCM4 model driven by MPI and HadGEM models to reproduce drought over the Caribbean region for the reference period 1970-2005 compared to CRU and UDEL databases, and project drought estimation under RCP8.5 for two time slices in the future: near future 2030-2065 and far future 2060-2095, using SPI and SPEI indexes. The results show that RegCM is 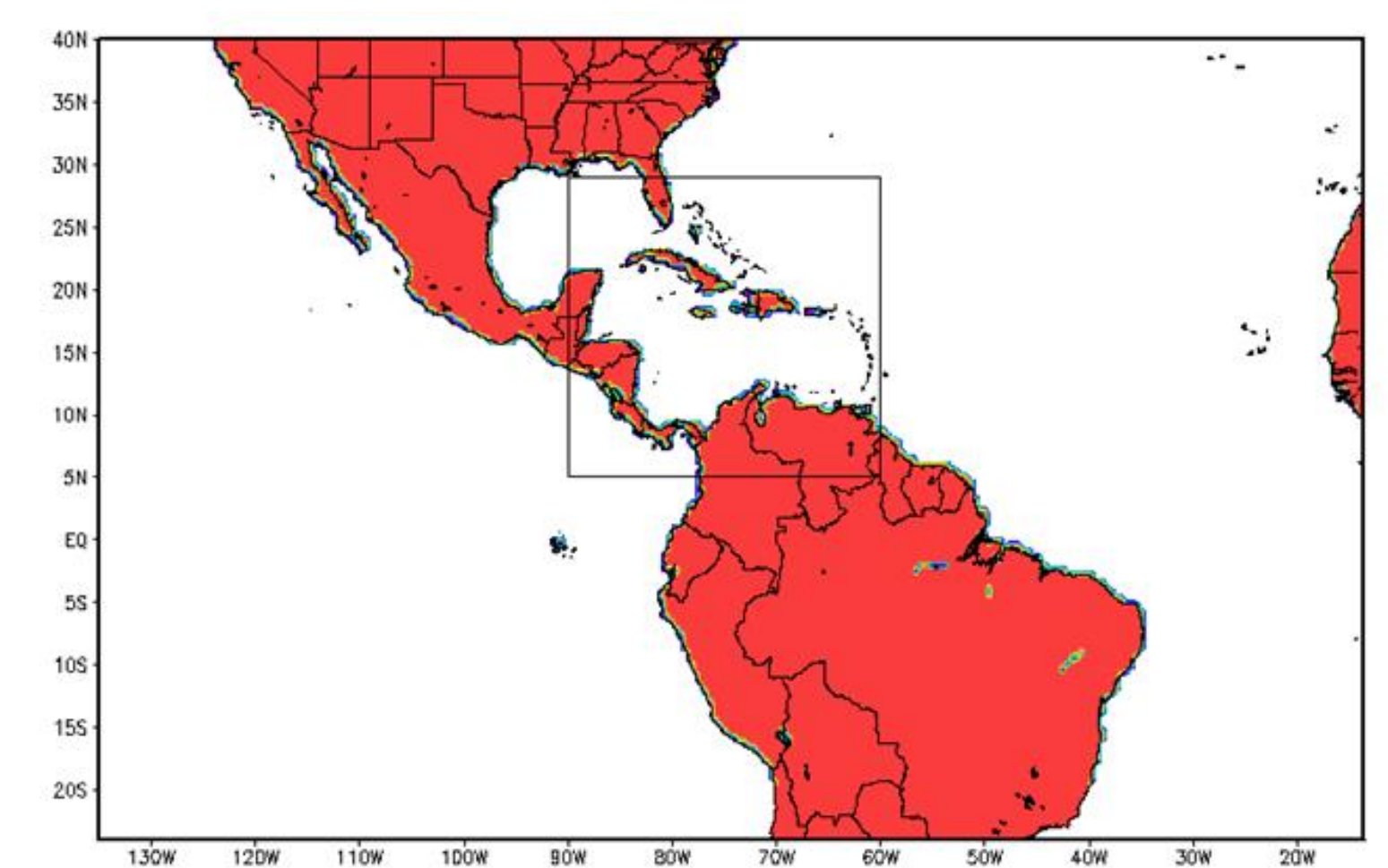able to reproduce 90.7%, 83.1% the number of dry years from MPI and 73.0%, 66.8% from HadGEM using SPI, SPEI respectively; but the model tends to see some areas, like Cuba and the Pacific Coast of Central America, drier than the observations. The number of drought years increase more than 50% for the end of the century for both indexes and also the frequency of the severe and extreme droughts will increase. The magnitude of the number of drought events and its intensity in the case of SPEI are larger, because this index takes into account the role of temperature in the water balance and RCP8.5 is a high emission scenario. For this index the Caribbean area shows a desertification pattern at the end of the

Data and Methodology

DATA

Precipitation and temperature from Regional Climate Model **RegCM4** (International centre fotr Theoretical Physics) driven by Global Climate Models **MPI** (Max Planck Institute) and **HadGEM** (Hadley Center) for the present period **1970-2005** and futures slices **2030-2065** and **2060-2095**, using **RCP 8.5**.
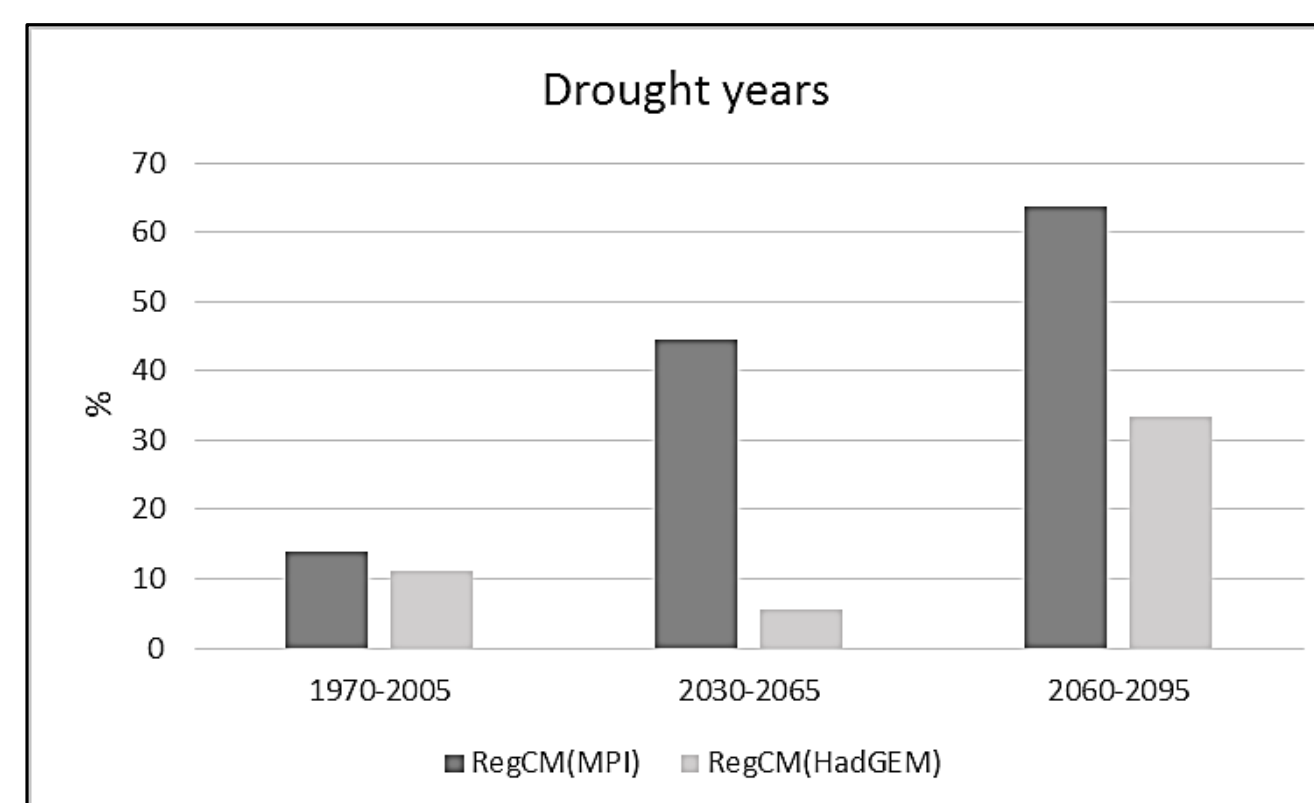
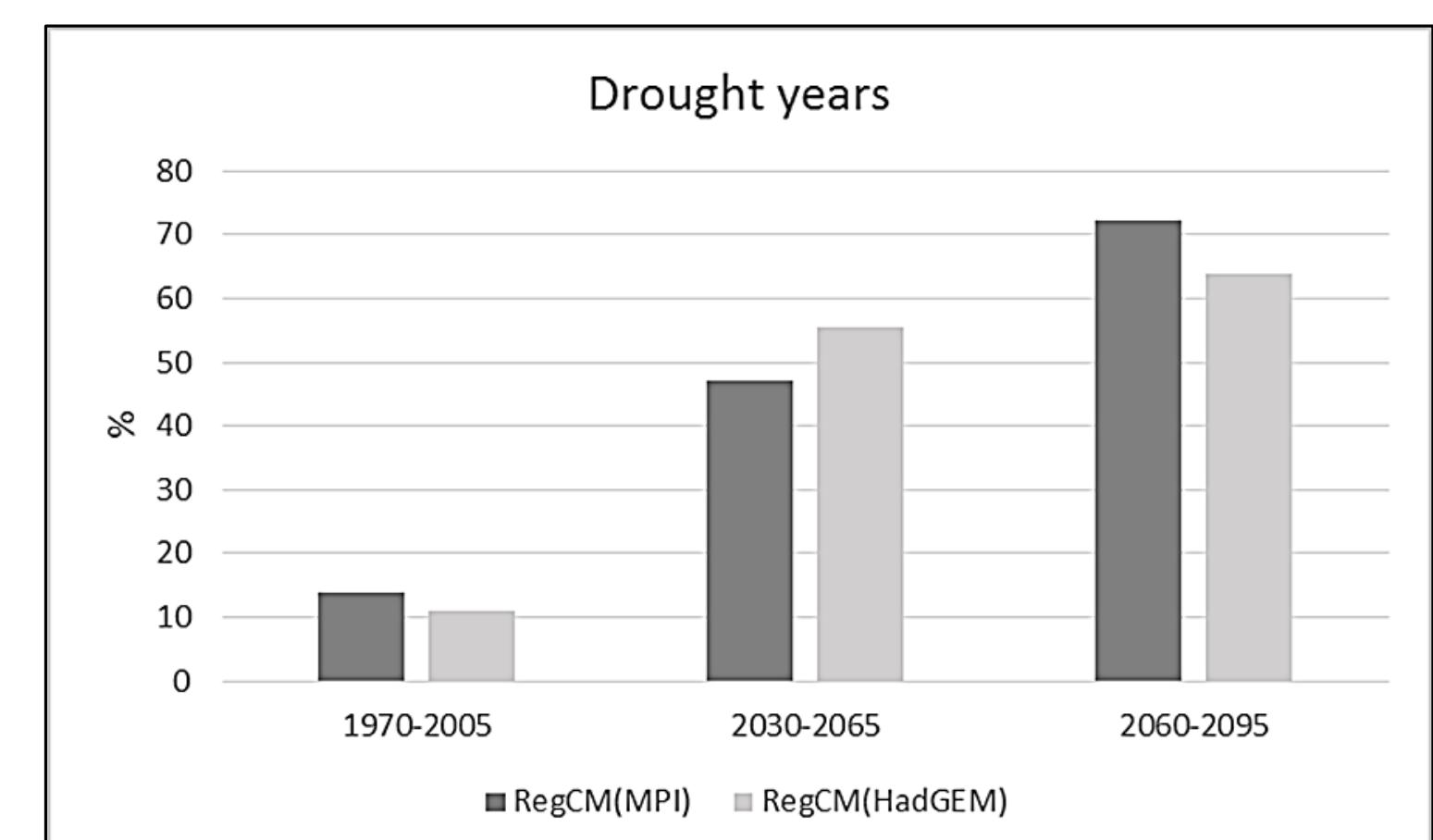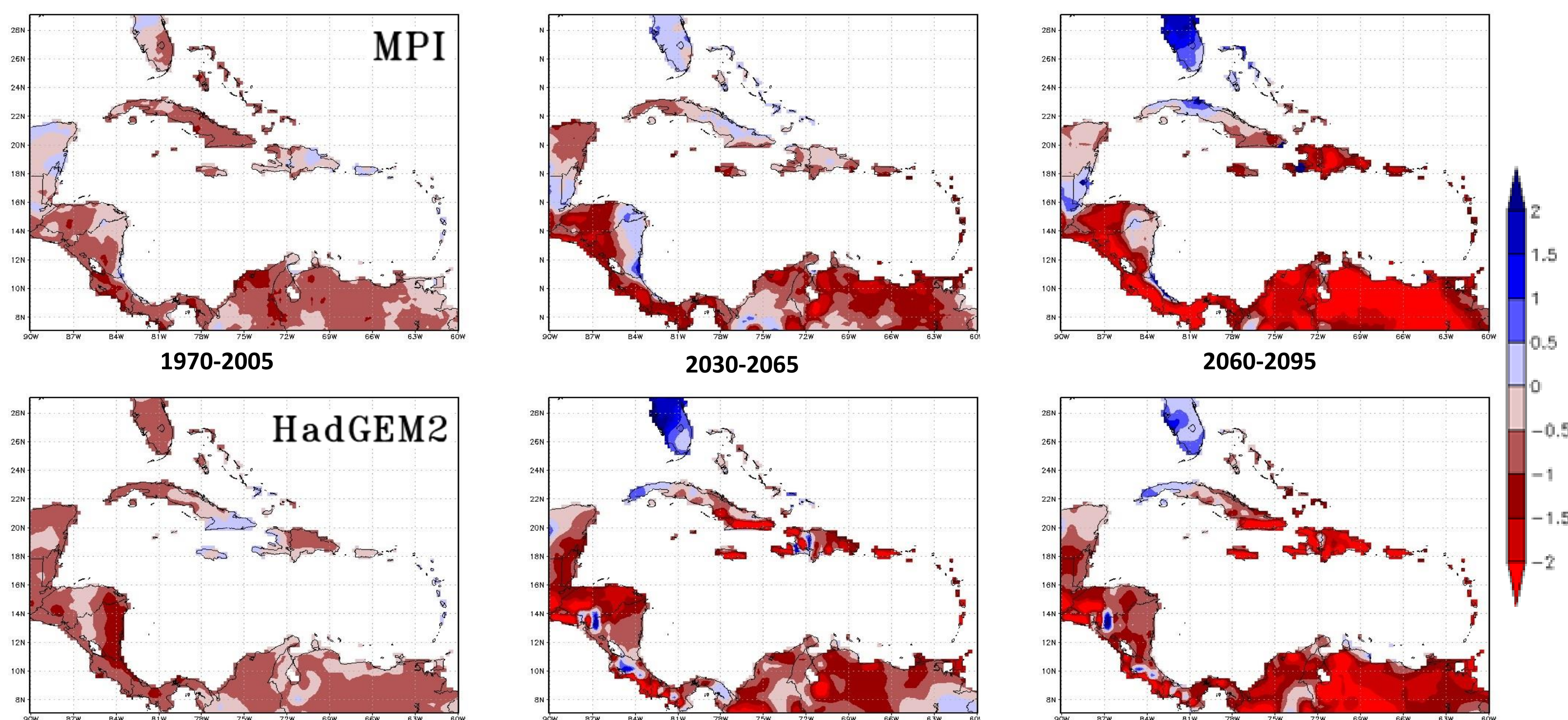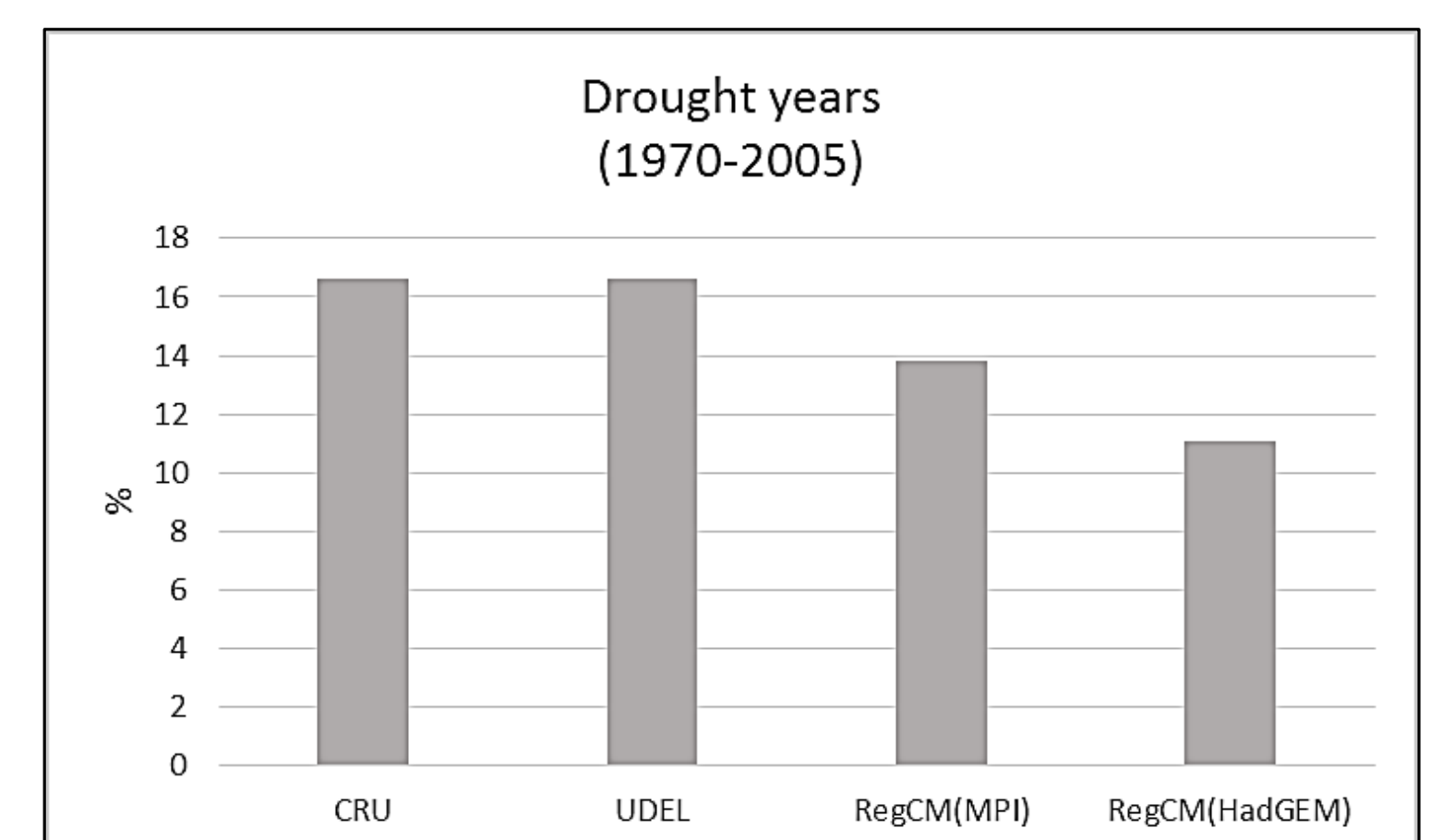| Index Value	Class
SPI ≥ 2.00	Extremely Wet
1.50 ≤ SPI < 2.00	Very Wet
1.00 ≤ SPI < 1.50	Moderately Wet
-1.00 ≤ SPI < 1.00	Near Normal
-1.50 ≤ SPI < -1.00	Moderate Drought
-2.00 ≤ SPI < -1.50	Severe Drought
SPI < -2.00	Extreme Drought

Results
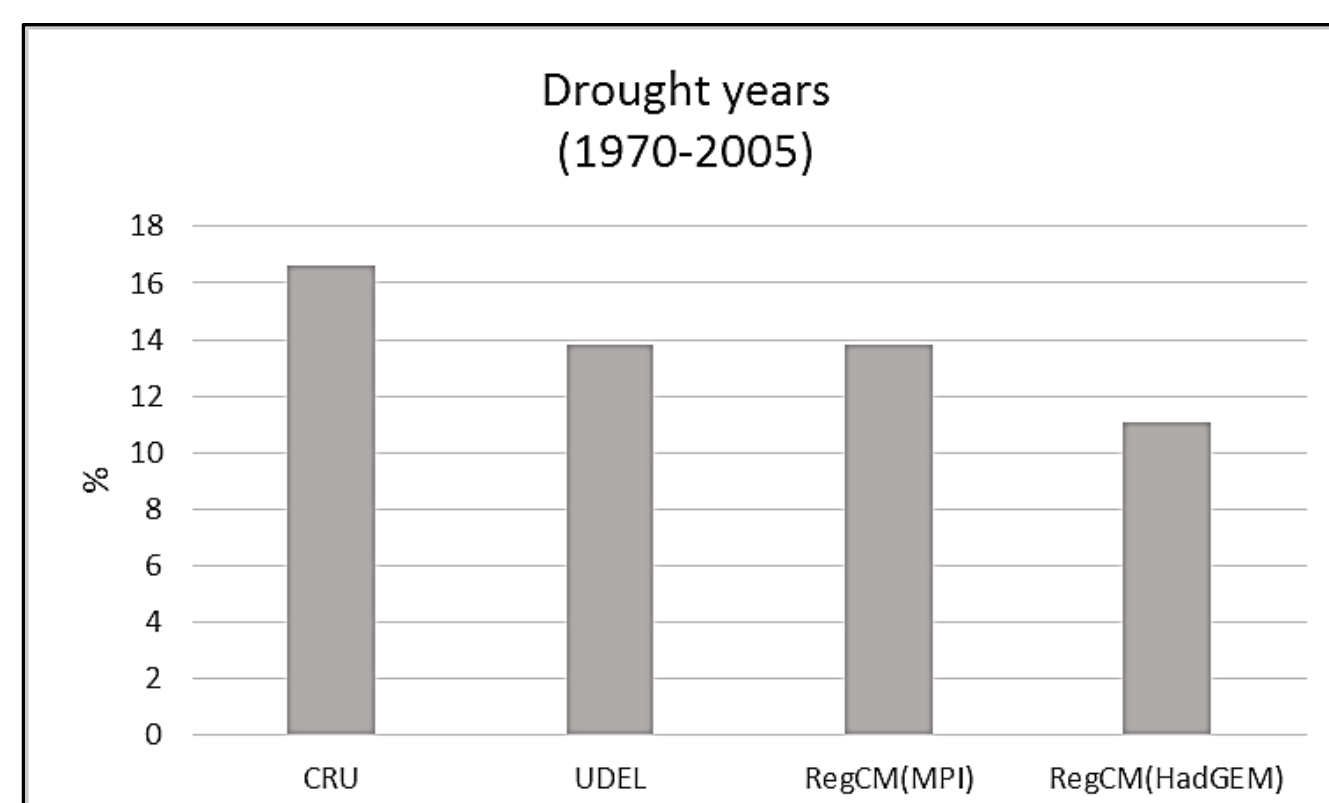
SPI12

SPEI12

Conclusions

- RegCM4 is able to reproduce 90.7%, 83.1% the number of drought years from MPI and 73.0%, 66.8% from HadGEM using SPI, SPEI respectively; but the model tends to see some areas, like Cuba and the Pacific Coast of Central America, drier than in the observations.
- The number of drought years increases more than 50% at the end of the century for both indexes and the same for the intensity of droughts events.
- The number of drought events and the intensity projected in SPEI case are larger compared with SPI, because SPEI index takes into account the role of temperature in the water balance and RCP8.5 is a high emission scenario.